STUDIES ON AUSTRALIAN CHAROPIDAE

Part 4—Convex Genera

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Shells which have their apical whorls convex in outline are placed in the genera discussed. There is a group with, and one without, apertural lamellae.

The choice of the term convex is probably unfortunate, for there are some forms referred to in this work as "planate" which in fact are a little convex in outline. However, study of the form reveals that some of these shells are more elevate in outline than the majority. The adjective "convex" is used here only to distinguish these elevated forms from those which are "concave" or, more or less, flattened. Members of the family *Paralaomidae* are sometimes markedly convex in outline, but the form of the *Charopidae* is subtly different and not so elevate as those shells which have developed in a, by comparison, dry habitat.

It is noticeable that the umbilicus is rather wide in the series without apertural lamellae, whereas it is narrow to minute in the series with this feature. Moreover, in the first series, the sculpture tends to be rather bold, while in the subimperforate, dentate genus, the sculpture is very fine.

Series I—Aperture not Dentate

Pernagera Iredale 1933: In his fascinating study of Western Australian land shells Iredale (1939), gave a description of this genus, for the type, *P. allanensis* Cox 1868, is a Western Australian shell. Points made were the elevation, wide umbilicus, coarse sculpture, loose coiling of the whorls with deep sutures, radially striate apex with the tip smooth. The aperture is rounded, and very uniform among the various species, the columella is generally rather straight. Many of the species are decorated with more or less defined streaks or flames of colour at intervals on the whorls. There is a whole series of species developed in Tasmania, some of them having the umbilicus narrower than the western species. In the essay preceding this, growth stages in a Tasmanian species were described. There is a Victorian species, *P. gatliffi* Gabriel which agrees with the Tasmanian, while *P. lake-sentrancicencia* Gabriel 1947 has some resemblance, though it lacks the colour markings and the straight columella.

Distribution: Western Australia, Tasmania, Victoria.

Setomedia Iredale 1933: These are fragile shells with smooth protoconch, adult sculpture elevated ribs with radial striae crossed by faint spirals in their interstices. Compared with *Pernagera* the ribbing is more elevate and wider spaced, while the type, *S. setricostata* Medley 1924 has slender upright bristles on the major ribs. A similar feature described as "long slender points" occurs in the only other species yet described, *S. aculeata* Hedley 1899, which is also said to have the spire level.

Distribution: Mid to northern New South Wales.

Epinicium Iredale 1939: These shells, like Pernagera, have a radially striate apex with the tip smooth. The adult sculpture consists of strong, distant radial ribs, with close radial striae in the interstices; the whorls are loosely coiled, the umbilicus wide and cavernous. There is a resemblance to *Pernagera* but the form is more depressed than in that genus. The type is *E. restifer* Iredale 1939, and there is a subspecies, *firmatum* Iredale, which has sculpture of bold ridges.

Distribution: Western Australia.

Kaumaropa Iredale 1937: Iredale remarked a resemblance to *Dentherona* but without the apertural tooth. There is a depression near the aperture on the last whorl, the sculpture being remarked as bold. The type is *K. subrugosa* Legrand 1871, and Brazier, who provided Legrand with the description, remarked the sculpture as of bold subrugose striae. Later Petterd referred

to the hold "projecting out of the ribs" in his monograph. Authors have sometimes used descriptive terms loosely in the past, adding to the confusion inevitable with such tiny shells. Between the ribs the interstitial sculpture is finely striate, and the umbilicus is exceptionally wide. Iredale gave the distribution as South Tasmania, but there are shells from the Blue Tier which is in the north-east of the State. Gabriel has the species from Victoria.

Distribution: Tasmania. Victoria.

Thrskelomensor Iredale 1933: This genus was introduced for *T. lisardensis* Pfeiffer 1863, a shell which appears to have more affinity with Pacific than Australian forms. It seems a doubtful Charopid, and is very distinctive, the sculpture being of close radial ribs with a strong secondary spiral; the shell is elevate in contour and strongly keeled. Consideration of this beautiful shell may be left to the experts.

Distribution: Lizard Island, North Queensland.

Series 2—Aperture Dentate

Bischoffena Iredale 1937: Iredale describes a subglobose form with spirally lirate protoconch, adult sculpture almost reticulate, minute umbilicus, and outer lip with two internal lamellae. The type is *B. bischoffensis* Petterd 1879. The fine sculpture recalls *Dupucharopa*, a Western Australian genus with a concave spire and narrow umbilicus. The protoconch sculpture of spirals combined with the adult sculpture and umbilical features suggested *Oreomava*, and to a lesser degree *Pillomena*, and these are Victorian and Tasmanian and perhaps allied.

Distribution: N.W. Tasmania (Mt. Bischoff).

Dentherma Iredale 1933: Shell depressed convex, elevate spire, aperture dentate; adult sculpture coarse sharp ribs, interstices with very fine radial striae, umbilicus moderately narrow and deep, the protoconch apparently radially ribbed. The aperture of this shell can only be described as subquadrate. The type is *D. dispar* Brazier 1871, which species has a small internal "oblong white callus tooth" near the base of the aperture, a particularly interesting and distinctive shell.

Distribution: Tasmania (Mt. Wellington).

One has observed that where the protoconch sculpture is spiral the subsequent sculpture is generally fine, on the other hand where the protoconch has radial sculpture, stronger sculpture tends to dominate the adult. The family as a whole tends toward strong sculpture compared with related groups, although Laomid forms exhibit many similarities. Both spiral and radial sculpture appear to be ancestral at least in part, but the tendency toward strong ribbing may be a comparatively recent acquisition. Shells are seen which have some interstitial riblets or striae tending to become stronger than others. The genera displaying smooth protoconch are variously connected with the other groups, one at least has very simple strong sculpture only, other sculpture having vanished if ever present. There is a tendency for some aspects of both adult and protoconch sculpture to become obsolete, and the strong radials and perhaps smooth protoconch to triumph. Fine sculpture is perhaps a sign of degenerating sculpture, or simply a retention of ancestral sculpture.

Cralopa Iredale 1941: The species *C. stroudensis* Cox has already been referred to in part 2 of these studies (1955 a), when it was observed that the shell differed in form from the genus *Gyrocochlea* in which Hedley had placed it. It was anticipated that *G. stroudensis* would be separated and in fact, this had already been done. This species was designated the type of the genus *Cralopa* in a work which had not been seen by the writer when previous parts of these studies were prepared. The essential points of difference are the nature of the spire which is not concave but very slightly raised in the

figure although Iredale describes it as flat. The shell is smaller than species of *Gyrocochlea*, while even more noticeable is the smaller umbilicus. Iredale (1941, p. 269) points out that the shell is more loosely coiled, has very fine sculpture, while the protoconch is smooth. He added a second species, *C. intensa* Iredale 1941, from Byron Bay.

Distribution: New South Wales.

Letomala Iredale 1941: Letomala was introduced for the species *L. contortus* Hedley first placed in the dentate genus, *Rhophodon* Hedley. However *L. contortus* differed as has already been noted by the writer, in having but few apertural lamellae, and the sculpture is much finer. In defining *Letomala*, Iredale draws attention to the large smooth protoconch; zigmoid, rather irregular sculpture; sinuate outer lip, giving a distinctive aperture, narrow above and broader below. There are three lamellae, one on the inner lip, and two basal on the outer lip.

Distribution: New South Wales.

KEY TO THE GENERA OF GROUP (*c*) CONVEX GENERA

Shell with spire elevate, aperture not dentate.
  Apex radially striate, tip smooth.
    Interstitial sculpture fine striae.
      Umbilicus wide, cavernous.
        Primary adult sculpture, close coarse radial ribs . . . *Pernagera*
        Primary adult sculpture, strong distant radial ribs . . . *Epinicium*
  Apex smooth.
    Adult sculpture elevated radial ribs.
      Interstial sculpture fine radial, faint spiral striae.
        Umbilicus wide, ribs with bristles . . . . . *Setomedia*
    Adult sculpture numerous fine curved riblets.
      Interstitial sculpture absent.
        Umbilicus narrow . . . . . *Cralopa*
Shell carinate.
    Adult sculpture radial ribs with dominant secondary spiral.
      Umbilicus moderately wide . . . . . *Theskelomensor*
Shell with marked groove above periphery at aperture.
    Adult sculpture bold radial ribs, subrugose.
      Interstitial sculpture fine striae.
        Umbilicus very wide (¼ diameter) . . . . . *Kanmaropa*
Shell will spire elevate, aperture lamellae few.
    Adult sculpture fine radials, microscopic spirals.
      Protoconch spirally lirate.
        Umbilicus very small, almost absent . . . . . *Bischoffena*
    Adult sculpture coarse sharp radial ribs.
      Interstitial sculpture fine striae.
Shell with spire depressed, apertural lamellae few.
    Adult sculpture fine close rugose striae.
      Protoconch smooth.
        Umbilicus wide, shallow . . . . . *Letomala*
        Umbilicus moderately narrow, deep . . . . . *Dentherona*

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